



Technical Bulletin (TB) 15.27-1
Engineering Requirements for Complying with
Oakland Municipal Code Chapter 15.27

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Part A. Administrative Provisions

A.1 Applicability

A.1.1. Purpose of this Bulletin. The purpose of this Bulletin is to establish requirements and building official interpretations regarding compliance with Oakland Municipal Code (OMC) Chapter 15.27.

Commentary: OMC Chapter 15.27 was created by Ordinance 13516 with an effective date of January 22, 2019. The Chapter 15.27 provisions are available at https://library.municode.com/ca/oakland/codes/code_of_ordinances?nodeId=TIT15BUCO

This Bulletin does not replace either the Ordinance or OMC Chapter 15.27. It is a supplement to the requirements in the Ordinance and the OMC, produced by the Bureau of Building in accordance with OMC Section 15.27.180, which authorizes the Bureau, as the designee of the City Administrator, to develop “interpretations, clarifications, forms, and commentary to facilitate implementation of the engineering criteria and other requirements [of OMC Chapter 15.27].”

Electronic copies of this Bulletin and other program materials are available at the program’s website: www.oaklandca.gov/resources/ssretrofit

A.1.2. Use of this Bulletin. This Bulletin addresses the engineering requirements of OMC Chapter 15.27, as follows:

- Mandatory seismic evaluation of building components other than the structural system of any target story, as required by OMC Sections 15.27.050.C and 15.27.165, shall comply with Part B of this Bulletin.
- Except where compliance by evaluation is demonstrated, mandatory seismic retrofit of the target story or stories, as required by OMC Sections 15.27.050.D and 15.27.170, shall comply with either Part C or Part D of this Bulletin.
- Evaluation of the target story or stories to demonstrate compliance without retrofit, as allowed by OMC Sections 15.27.050.D and 15.27.170, shall comply with Part D of this Bulletin.

Commentary: The term “target story” is defined in OMC Section 15.27.150 and in Parts C and D of this Bulletin. Compliance with OMC Chapter 15.27 involves five “steps” represented by the



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five columns of Table 15.27.070: Compliance Deadlines. The table is reproduced here for reference, with the step numbers and the actual deadlines added. For notification purposes, the Bureau has created two subcategories within Tier 1: Tier 1-NR and Tier 1-LB. Both are subject to the Tier 1 requirements and deadlines given in OMC Chapter 15.27.

With reference to the table, this Bulletin addresses only Steps 3, 4, and 5. Information and instructions for complying with the optional Steps 1 and 2 are given on the program’s website.

Table 15.27.070, modified: Compliance Deadlines

<i>Building Group or Compliance Tier</i>	<i>Compliance Scope Item</i>				
	<i>STEP 1. Document that building is not a subject building (optional) (15.27.050.A)</i>	<i>STEP 2. Document that building is eligible for a later compliance tier (optional) (15.27.050.B)</i>	<i>STEP 3. Perform mandatory evaluation and submit initial affidavit of compliance (15.27.050.C and F)</i>	<i>STEP 4. Obtain retrofit permit or submit target story evaluation report (15.27.050.D.1 or D.2)</i>	<i>STEP 5. Perform retrofit work and obtain approval on final inspection; submit final affidavit of compliance (15.27.050.D.3 and E)</i>
<i>Non-subject buildings</i>	<i>2/21/2020</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
<i>Tier 1-NR or Tier 1-LB</i>	<i>NA</i>	<i>2/21/2020</i>	<i>2/21/2021</i>	<i>2/21/2022</i>	<i>2/21/2023</i>
<i>Tier 2</i>	<i>NA</i>	<i>2/21/2020</i>	<i>2/21/2022</i>	<i>2/21/2023</i>	<i>2/21/2024</i>
<i>Tier 3</i>	<i>NA</i>	<i>2/21/2020</i>	<i>2/21/2023</i>	<i>2/21/2024</i>	<i>2/21/2025</i>

A.1.3. Other regulations. Unless otherwise specified, work considered by this Bulletin is subject to all City of Oakland regulations and procedures applicable to building alteration projects.

Commentary: *The main purpose of this Bulletin is to reference, modify, and interpret ASCE 41 and CEBC Chapter A4, as shown in Parts B through D. All work done to comply with OMC Chapter 15.27 should otherwise comply with normal regulations and procedures, including those related to design review, permitting, fees, and inspections.*

Mandatory seismic retrofit to comply with OMC Chapter 15.27 is deemed exempt from requirements of the Alquist-Priolo Earthquake Fault Zoning Act because the cost of the mandatory work is not expected to exceed 50 percent of the value of the structure (California Public Resources Code Section 2621.7).



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A.2 Documentation

A.2.1. Combined work scopes. Non-mandatory seismic improvements may be shown on the same plans and regulated under the same permits as mandatory seismic retrofit work, subject to the approval of the building official. Mandatory and non-mandatory seismic improvements shall be clearly delineated on the permit application. Non-seismic alteration work may be shown on the same plans as seismic improvements but shall be regulated under separate permits.

Commentary: This provision anticipates that owners might choose to make additional seismic improvements based on the seismic evaluation required by Section 15.27.050.C (see also Part B of this Bulletin). Some might choose to make non-seismic alterations associated with adding an Additional Unit, as allowed by Section 3 of the Ordinance, which adds Section 17.102.250 to the Oakland Planning Code.

A.2.2. Permit Application Worksheet.

A.2.2.1. Mandatory seismic retrofit. Where retrofit of the target story is required, the Permit Application Worksheet shall identify the Type of Work as “Retrofit” and shall include, in the Description of Proposed Work, the following: “Mandatory seismic retrofit designed to comply with OMC Chapter 15.27.”

Commentary: Structural retrofit of the target story, where required, is the only mandatory seismic retrofit contemplated by OMC Chapter 15.27.

A.2.2.2. Non-mandatory seismic retrofit. Where seismic retrofit in addition to the mandatory seismic retrofit is proposed, the Permit Application Worksheet shall identify the Type of Work as “Retrofit” and shall include, in the Description of Proposed Work, the following: “Non-mandatory seismic retrofit.”

Commentary: Non-mandatory seismic retrofit is any seismic improvement to the structure or to nonstructural components that is not required for compliance with OMC Chapter 15.27. In general, any seismic improvement that is not part of the target story retrofit is non-mandatory. Providing more capacity within the target story retrofit than is strictly required by the design criteria is considered part of the mandatory seismic retrofit.

A.2.3. Plans. Submitted plans shall include all information and details needed to properly construct all of the intended work. Any non-mandatory seismic retrofit work and any non-seismic alteration shall be clearly identified and distinguished from the mandatory seismic retrofit work. In addition, submitted plans shall include:

1. As part of the Project Title, the words “OMC Chapter 15.27 seismic retrofit.”
2. In the Background Information section, the following: “Mandatory seismic retrofit designed to comply with OMC Chapter 15.27.”
3. Existing conditions requiring verification during construction, clearly identified, and coordinated



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with the structural calculations.

4. Information required by the reference code or standard used, as modified in Part C or Part D of this Bulletin.

Commentary: Non-seismic alteration is any optional work that is neither mandatory seismic retrofit nor non-mandatory seismic retrofit. Work done to create one or more Additional Units, as allowed by Section 17.102.250 of the Oakland Planning Code, is an example of non-seismic alteration. Replacement of architectural elements, equipment, and other non-structural components that had to be removed to implement the mandatory or non-mandatory seismic retrofit is considered part of that seismic work and is not considered non-seismic alteration.

A.2.4. Structural calculations. Submitted calculations shall include all information needed to support and validate the submitted plans and to demonstrate compliance with this Bulletin. The calculations shall include:

1. A statement that the calculations are intended to comply with OMC Chapter 15.27.
2. For any non-mandatory seismic retrofit work or non-seismic alteration, a statement and description of the proposed engineering criteria.
3. A listing of existing conditions assumed for purposes of condition assessment and structural design, each of which shall also be identified on the plans as requiring verification during construction.
4. All building investigation, soils, geotechnical, condition assessment, or other supporting reports, as well as a summary of such reports indicating how the findings or conclusions are reflected in the structural calculations.
5. Identification of structural properties and capacities assumed for all existing materials and elements, including any capacity reductions for damage, deterioration, or defect.
6. Identification of structural properties and capacities assumed for all new materials and elements, including product literature for proprietary devices or systems.
7. If requested by the building official, verification calculations for any engineering software used.
8. Other information as required by the building official.

A.3 Quality assurance

Commentary: Quality assurance is addressed in Part A of this Bulletin so that the same requirements will apply regardless of the evaluation or retrofit criteria used.



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A.3.1 Structural observation. Structural observation, in accordance with Section 1704.6 of the *California Building Code*, is required, regardless of seismic design category, height, or other conditions. Structural observation shall include visual observation of work for conformance to the approved construction documents and confirmation of existing conditions assumed during design.

Commentary: This requirement is consistent with CEBC Section A407.1, which was revised for the 2022 CEBC consistent with the 2019 edition of this Bulletin.

A.3.2 Contractor responsibility. Contractor responsibility shall be in accordance with Section 1704.4 of the *California Building Code*.

Commentary: This requirement is consistent with CEBC Section A407.2, which was created for the 2022 CEBC consistent with the 2019 edition of this Bulletin.

A.3.3 Testing and inspection. Structural testing and inspection for new construction materials, submittals, reports, and certificates of compliance, shall be in accordance with Sections 1704 and 1705 of the *California Building Code*. Work done to comply with OMC Chapter 15.27 shall not be eligible for Exceptions 1, 2, or 3 of *California Building Code* Section 1704.2 or for the Exception to *California Building Code* Section 1705.13.2.

Commentary: This requirement is consistent with CEBC Section A407.3, which was created for the 2022 CEBC consistent with the 2019 edition of this Bulletin.

History note: A typo in the 2019 edition of this Bulletin has been corrected. The reference in the final sentence should be to CBC Section 1705.13.2, not 1705.12.2.

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Part B. Engineering Criteria for Mandatory Seismic Evaluation and Schematic Retrofit Report

Commentary: With reference to the Compliance Deadlines table above, Part B addresses “Step 3: Perform mandatory evaluation and submit initial affidavit of compliance.” OMC Section 15.27.050.C calls for an evaluation and a schematic retrofit report, with criteria given in OMC Section 15.27.165. The purpose of the evaluation and schematic retrofit report is to provide the owner with information about seismic risks other than the vulnerable target story, especially risks that are expected to be relatively easy to mitigate while the target story is retrofitted. If deficiencies identified by this evaluation are proposed to be retrofitted, that work is considered non-mandatory seismic retrofit.

B.1 Reference standard. The mandatory seismic evaluation shall use the 2017 edition of *Seismic Evaluation and Retrofit of Existing Buildings* [ASCE/SEI 41-17], referenced here as ASCE 41.

Commentary: Use of ASCE 41 is specified by OMC Section 15.27.165.

B.2 Scope of evaluation. The mandatory seismic evaluation shall include all procedures prescribed by ASCE 41 for a Tier 1 Screening with a performance objective of Nonstructural Life Safety with the BSE-1E hazard. Using ASCE 41 Table 17-38, the scope of the evaluation shall consider at least the following potential deficiencies located anywhere in the building:

- Hazardous Materials: Shutoff Valves, Flexible Couplings
- Partitions: Unreinforced Masonry (including boiler room partitions)
- Masonry Veneer: Ties, Shelf Angles, Weakened Planes, Unreinforced Masonry Backup, Anchorage, Weep Holes
- Parapets, etc.: URM Parapets or Cornices, Canopies, Concrete Parapets, Appendages
- Masonry Chimneys: URM Chimneys, Anchorage
- Mechanical and Electrical Equipment: Fall-Prone Equipment (including gas-fueled water heater tanks).

Commentary: In accordance with OMC Section 15.27.165, “The Bureau of Building is authorized to determine the required scope of the building evaluation.” This section of the Bulletin gives the Bureau’s required minimum scope. The scope was determined by considering potential falling hazards, egress hazards, and fire hazards that are likely to be cost-effectively identified and mitigated during the course of the target story retrofit.

Compliance with this section is independent from, and does not relieve the owner of responsibility for, compliance with any other housing or building regulation, including review of decks and balconies.

A template with the listed items from ASCE 41 Table 17-38 is available on the program website.



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B.3 Schematic retrofit report. For each evaluation scope item classified as Noncompliant or Unknown, a schematic retrofit report shall briefly describe a mitigation measure that, if implemented, would allow the scope item to be reclassified as Compliant or Not Applicable.

Commentary: OMC Section 15.27.050.C calls for a “schematic retrofit report” to accompany the evaluation. Design calculations, drawings, and cost estimates are not required but may be provided by agreement between the Owner and the design professional.

B.4 Affidavit of compliance. The Owner shall timely submit to the Bureau of Building an affidavit of compliance with the minimum requirements described in this Part.

Commentary: In accordance with OMC Section 15.27.050.F, compliance with the Step 3 requirements is demonstrated by submitting a signed affidavit. A blank affidavit form is available on the program website.

The engineer responsible for the evaluation and schematic retrofit report need not sign the affidavit but may prepare the affidavit for the Owner’s signature and may submit it on the Owner’s behalf. The evaluation and schematic retrofit report itself need not be submitted and will not be reviewed or approved by the Bureau. While the affidavit is required to show compliance with OMC Chapter 15.27, there is no requirement in Chapter 15.27 for the Owner to address any potential deficiencies identified by the evaluation.



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Part C. Engineering Criteria for Target Story Retrofit Using CEBC Chapter A4

C.1 Reference code. Appendix Chapter A4 of the current edition of the *California Existing Building Code* (Chapter A4), as adopted and amended by OMC Title 15 and as further modified and interpreted by Section C.2 of this Bulletin, shall be permitted as the criteria for mandatory seismic retrofit to comply with OMC Chapter 15.27. Any code references within Chapter A4 shall be construed to refer to the corresponding provisions of the *California Building Code* (CBC), the *California Existing Building Code* (CEBC), and their reference standards, as adopted and amended by the City of Oakland.

Commentary: OMC Section 15.27.170 allows either CEBC Chapter A4 or ASCE 41 to be used as the retrofit design criteria. Therefore, Part C allows but does not require Chapter A4. (Part D covers the use of ASCE 41.) Some buildings subject to OMC Chapter 15.27 will be able to comply by evaluation, with no retrofit needed, but only ASCE 41 (as interpreted in Part D) is allowed as the basis for compliance by evaluation, since Chapter A4 is not written as an evaluation methodology.

The current CEBC is the 2022 edition, based on the 2021 International Existing Building Code (IEBC), and published by ICC in read-only mode at <https://codes.iccsafe.org/public/collections/I-Codes>. Consistent with CBC Chapter 35 and CEBC Chapter 16, all references to “ASCE 7” mean ASCE/SEI 7-16 with Supplements 1, 2, and 3.

The 2022 CEBC and 2021 IEBC incorporate substantial changes relative to the prior editions. As described in this Bulletin, nearly all of the changes are consistent with modifications and interpretations provided in the prior edition of this Bulletin, so even though the code has changed, retrofits designed to comply with the current code and Bulletin should not be substantially different from designs based on the prior editions. Even so, starting on January 1, 2023, all new submittals intended to comply with OMC Chapter 15.27 must use the current editions of the code and this Bulletin.

OMC Section 15.27.170 also allows the California Historical Building Code as retrofit criteria for eligible historic buildings. Demonstration of eligibility and modifications to Chapter A4 based on the CHBC should be proposed and will be approved on a case-by-case basis.

The commentary below also refers in places to FEMA P-807 (May 2012), titled Seismic Evaluation and Retrofit of Multi-Unit Wood-Frame Buildings With Weak First Stories, available at: <https://atcouncil.org/files/FEMA%20P-807Indexed.pdf>

C.2 Modification and interpretation of CEBC Chapter A4

The following modifications and interpretations refer to Chapter A4 section numbers.



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A401.2 Scope. *Omit this section.*

Commentary: In the context of OMC Chapter 15.27, the applicability of Chapter A4 is established by the Ordinance and by the definition of Subject Buildings in OMC Section 15.27.030.

A402 Definitions. *Add, omit, or revise as follows:*

TARGET STORY. Either (1) a basement story or underfloor area that extends above grade at any point or (2) any story above grade, where the wall configuration of such basement, underfloor area, or story is substantially more vulnerable to earthquake damage than the wall configuration of the story above, except that a story is not a target story if it is the topmost story or if the difference in vulnerability is primarily due to the story above being a penthouse or an attic with a pitched roof.

Commentary: This definition, given in OMC Section 15.27.150, is added as a preferred way to refer to the structural deficiency of interest in Chapter A4 and the subject of mandatory seismic retrofit.

- *The definition simplifies and clarifies the Chapter A4 terminology. Chapter A4 and this Bulletin call for consideration of whole stories, but Chapter A4 only defines its critical deficiencies in terms of wall lines and does not clearly recognize complexities posed by sloped sites (e.g. the target story might not be the ground story, and a building might have more than one target story). That said, any story that contains a soft wall line, a weak wall line, or an open-front wall line as defined in Chapter A4 would normally be considered a target story.*
- *Because the definition is not quantitative, it usefully relies on the judgment of engineers or other qualified design professionals; Step 1, described in the Compliance Deadlines table above, offers each owner noticed by the City an opportunity to demonstrate that the building in question has no target stories or wood frame target stories.*
- *By including underfloor areas, the definition avoids confusion about crawl spaces and the building code definition of “story,” especially on sloped sites.*
- *The definition facilitates coordination with similar programs in Berkeley and San Francisco and with Oakland’s HMGP-funded SHOP program already in effect in Oakland.*

WEAK WALL LINE. A wall line in a story where the story strength is less than 80 percent of the story above in the direction under consideration. For purposes of this definition, nonconforming structural materials shall not be considered.

Commentary: The added sentence coordinates with the use of “expected story strength” in Section A403.3.1.



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WOOD FRAME TARGET STORY. A target story in which a significant portion of lateral or torsional story strength or story stiffness is provided by wood frame walls.

Commentary: Together with the definition of target story, this definition, also given in OMC Section 15.27.150, identifies the deficiency of interest in Chapter A4 and the subject of mandatory seismic retrofit. As with the definition of target story, the definition of wood frame target story relies intentionally on the judgment of design professionals.

A403.1 General. *Omit the exception and revise the first sentence as follows:* Modifications required by the provisions in this chapter shall be designed in accordance with the *California Building Code* provisions for new construction, except as modified or otherwise allowed by this chapter and by TB 15.27-1.

Exception: ~~Buildings for which the prescriptive measures provided in Section A404 apply and are used.~~

Alteration of the existing lateral force-resisting system or vertical load-carrying system shall not reduce the strength or stiffness of the existing structure, unless the altered structure would remain in conformance to the building code and this chapter.

Commentary: The exception is omitted because the additional phrase “or otherwise allowed” makes it moot.

A403.2 Scope of analysis. *References to “soft, weak, or open-front wall line” shall be taken to mean “wood frame target story.”*

Commentary: By substituting the definition of wood frame target story, this modification clarifies the scope of work. (It also makes the two sentences about podium structures and hillside conditions largely moot.)

A403.3.1 Expected story strength. *Modify the first sentence as follows:* Despite any other requirement of Section A403.3 or A403.4, the total expected strength of retrofit elements added to any wood frame target story need not exceed 1.7 times the expected strength of the story immediately above in a two-story building, or 1.3 times the expected strength of the story immediately above in a three-story or taller building, as long as the retrofit elements are located symmetrically about the center of mass of the story above or so as to minimize torsion in the retrofitted story. Calculation of expected story strength and identification of irregularities in Section A403.3 shall be based on the expected strength of all wall lines, even if sheathed with nonconforming materials. The strength of a wall line above the retrofitted story shall be permitted to be reduced to account for inadequate load path or overturning resistance.

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A403.3.2. Seismicity parameters, site class, and geologic hazards. *Add the first sentence and modify the second sentence as follows:* With reference to ASCE 7 Sections 11.4.3 and 11.4.4, and for purposes of complying with OMC Chapter 15.27, seismicity parameters and site coefficients shall be those corresponding to the default designation of Site Class D unless site-specific geotechnical data is shown to justify a different designation. For any site designated as Site Class E or F, the value of F_a shall be taken as 1.2. Site-specific procedures are not required for compliance with this chapter. Mitigation of existing geologic site hazards such as liquefiable soil, fault rupture, or landslide is not required for compliance with this chapter.

Commentary: In general, Site Class and associated coefficients and seismicity parameters should be determined following the normal procedures for new construction. This provision combines a new provision in 2022 CEBC with additional modifications in TB15.27-1. The first sentence indicates that the Bureau has not made any determinations regarding soil type that would affect application of ASCE 7 Section 11.4.3. Further, it makes clear that default values should be used in the absence of reliable site-specific data; this ensures that where the actual site class is unknown, the design does not inadvertently use unconservative criteria that might arise from a well-meaning but incorrect assumption of Site Class E or F. In the second sentence, the new CEBC provision specifies a value of F_a for similar reasons. This Bulletin applies the same concept to Site Class F to simplify the derivation of design criteria, since the intent of both Chapter A4 and OMC Chapter 15.27-1 is to avoid requiring additional geotechnical investigation. (Note, however, that the default factor has changed from 1.3 in the 2019 Bulletin to 1.2 in Chapter A4 for consistency with ASCE 7 Sections 11.4.4 and 11.4.8.) Thus, the first sentence applies where the site class is unknown, and the second sentence applies a similar idea even where the site class is known to be Site Class E or F.

Seismic hazard parameters as needed may be obtained from the ASCE 7 Hazard Tool at <https://asce7hazardtool.online/>. Note that when using this or similar tools, the “default” Site Class D specified by this provision and by ASCE 7 Sections 11.4.3 and 11.4.4 is not the same as a known Site Class D. Also, where Site Class E or F is known, these tools might not automatically use the value of F_a required here, so design professionals might need to make that adjustment separately.

A403.8. Floor diaphragms. *Modify the exception as follows:*

Exception: Where the existing vertical elements of the seismic force-resisting system are shown to comply with ~~this chapter~~ OMC Chapter 15.27 by evaluation, diaphragms need not be evaluated.

Commentary: The exception allows compliance by evaluation (Part D of this Bulletin) to focus on the vertical SFRS elements – the walls and frames – without considering a diaphragm deficiency by itself to justify an intrusive retrofit.

A403.10.1 Special moment frames. *Modify the provision as follows:* Steel special moment frames shall comply with all applicable provisions of AISC 341, including but not limited to connection design and lateral bracing of beams, except that Section E3.4a addressing strong-column/weak-beams of AISC 341,



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is not required for columns that carry no gravity load. Proprietary frame systems that qualify as special moment frames shall be permitted.

Add sections A403.10.3 and A403.10.4:

A403.10.3 Intermediate or ordinary moment frames. Steel intermediate or ordinary moment frames shall comply with all applicable provisions of AISC 341.

Commentary: See Section A403.3 Exception 5 for a waiver on height limits otherwise applicable to these systems.

A403.10.4 Cantilevered column systems. Steel special or ordinary cantilevered column systems shall comply with all applicable provisions of AISC 341.

A404.1 Limitation. *In the first sentence, omit the words “and only where deemed appropriate by the code official.”*

Commentary: These prescriptive measures are deemed appropriate for compliance with OMC Chapter 15.27.

Add Sections A405.3.6 and A405.3.7:

A405.3.6 Existing masonry partitions. Masonry partitions or fire separation walls within a target story shall be investigated to determine their capacity to resist story shears and deformations, whether intended as seismic force-resisting elements or not. The investigation shall consider their material strength and condition, grouting and reinforcing, connections and continuity to stories above and foundation below, and related detailing and load path as they relate to likely performance in in-plane shear, out-of-plane shear, overturning moment, and uplift. Based on the investigation, the design professional shall document and substantiate a design approach and acceptability criteria.

Commentary: Some Oakland buildings are known to have concrete masonry fire separation partitions that might act as de facto seismic force-resisting elements, even if not designed to carry lateral forces and not detailed for ductile response. Since the construction of these partitions is not well documented, it is the responsibility of the design professional to understand their likely performance and to account for it in the retrofit design. In some cases, the walls might be usable as SFRS elements (as is, or as strengthened). In other cases, it might be preferable to isolate them from the seismic response by breaking the lateral load path, as long as necessary fire safety and support for gravity loads is maintained.

A405.3.7 Existing unreinforced brick footings. The capacity of an existing brick footing to resist shear or pullout of an existing or new anchor shall be established by testing or by reference to approved tests of similar conditions.



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Commentary: Older buildings might have unreinforced brick footings. In general, these are unlikely to be adequate for new or strengthened shear walls, but the added provision allows a method to substantiate their capacity.

A406.1 General. *Omit this subsection.*

Commentary: Section A.2.3 of this Bulletin replaces Chapter A4 Section A406.1.

SECTION A407. QUALITY CONTROL *Omit this section.*

Commentary: Section A.3 of this Bulletin replaces Chapter A4 Section A407.

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Part D. Engineering Criteria for Target Story Evaluation or Retrofit Using ASCE 41

D.1 Reference standard. ASCE 41, the 2017 version of *Seismic Evaluation and Retrofit of Existing Buildings*, as modified and interpreted by Section D.2 of this Bulletin, shall be permitted as the criteria for evaluation of existing target stories and for mandatory seismic retrofit where such retrofit is required.

Commentary: OMC Section 15.27.170 allows either ASCE 41 or CEBC Chapter A4 to be used as the retrofit design criteria. Therefore, Part D allows but does not require ASCE 41. (Part C covers the use of Chapter A4 for target story retrofit.) The phrase “where such retrofit is required” refers to the possibility that a subject building might comply by evaluation, with no retrofit needed. ASCE 41 may also be used as the basis for compliance by evaluation.

D.2 Definitions (ASCE 41 Section 1.2.1)

TARGET STORY. Either (1) a basement story or underfloor area that extends above grade at any point or (2) any story above grade, where the wall configuration of such basement, underfloor area, or story is substantially more vulnerable to earthquake damage than the wall configuration of the story above, except that a story is not a target story if it is the topmost story or if the difference in vulnerability is primarily due to the story above being a penthouse or an attic with a pitched roof.

Commentary: This definition, given in OMC Section 15.27.150, is added as a preferred way to refer to the structural deficiency of interest and the subject of mandatory seismic retrofit.

- *Because the definition is not quantitative, it usefully relies on the judgment of engineers or other qualified design professionals; Step 1, described in the Compliance Deadlines table above, offers each owner noticed by the City an opportunity to demonstrate that the building in question has no target stories or wood frame target stories.*
- *By including underfloor areas, the definition avoids confusion about crawl spaces and the building code definition of “story,” especially on sloped sites.*
- *The definition facilitates coordination with similar programs in Berkeley and San Francisco and with the voluntary SHOP program already in effect in Oakland.*

WOOD FRAME TARGET STORY. A target story in which a significant portion of lateral or torsional story strength or story stiffness is provided by wood frame walls.

Commentary: Together with the definition of target story, this definition, also given in OMC Section 15.27.150, identifies the deficiency of interest and the subject of mandatory seismic retrofit. As with the definition of target story, the definition of wood frame target story relies intentionally on the judgment of design professionals.

D.3 Scope of evaluation or retrofit (ASCE 41 Section 1.1)

D.3.1 Elements to be considered. Evaluation or retrofit to comply with OMC Chapter 15.27 need only consider the lateral load path elements from the wood diaphragm immediately above any wood frame

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target story to the foundation soil interface. Stories above the uppermost wood frame target story shall be considered in the analysis but need not be modified. The lateral-load-path analysis for added structural elements shall include evaluation of the allowable soil-bearing and lateral pressures in accordance with the building code.

Commentary: Normally, ASCE 41 is applied to an entire building or structure. OMC Section 15.27.160, however, makes clear that the intent of the chapter is to apply only to the building's wood frame target stories. The wording is consistent with the similar scope of CEBC Chapter A4, Section A403.2.

D.3.2 Required Retrofit Strength. Despite any other requirement of ASCE 41, the total expected strength of retrofit elements added to any target story need not exceed 1.7 times the expected strength of the story immediately above in a two-story building, or 1.3 times the expected strength of the story immediately above in a three-story or taller building, as long as the retrofit elements are located symmetrically about the center of mass of the story above or so as to minimize torsion in the target story. Calculation of expected story strength and identification of irregularities shall be based on the expected strength of all wall lines, even if sheathed with nonconforming materials. The strength of a wall line above the target story may be reduced to account for inadequate load path or overturning resistance.

Commentary: This added provision implements the allowance in OMC Section 15.27.170 that "the strength of a retrofitted Target Story need not exceed that required to develop the strength of stories above." This provision is consistent with this Bulletin's addition of Section A403.3.1 to CEBC Chapter A4 (see Part C). The provision is based on a SEAONC recommendation to cap the required strength, consistent with FEMA P-807. Strictly speaking, the allowance should not be needed if the ASCE 41 rules for selecting analysis procedures and for modeling secondary components are carefully followed. In concept, the strength cap could be applied to all elements (new and existing) in the target story, but it is applied only to retrofit elements to ensure that some ductility, reliability, and torsion control is provided.

The expected strength of the story above may be calculated using the FEMA P-807 criteria. If the strength is reduced to account for an inadequate load path, as allowed, the load path should be documented by field observation and condition assessment; otherwise, the strength calculation should assume an adequate load path to avoid underestimating the upper story strength.

D.4 Modification and interpretation of ASCE 41

D.4.1 Performance Objective (ASCE 41 Sections 1.4.1 and 1.5.2). For either evaluation or retrofit, the performance objective shall be Structural Life Safety in the BSE-1E seismic hazard.

Commentary: This objective is given in OMC Section 15.27.170.B. It need only be applied to the building elements identified in Bulletin Section D.3.1. As such, the mandatory seismic retrofit contemplated by OMC Chapter 15.27 is, in ASCE 41 terms, a partial retrofit in accordance with ASCE 41 Section 2.2.5.

OMC Chapter 15.27 does not require any nonstructural retrofit. See Bulletin Part B regarding

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mandatory nonstructural evaluation.

D.4.2 Seismic hazard, seismicity parameters and Site Class (ASCE 41 Section 2.4). With reference to ASCE 7 Sections 11.4.3 and 11.4.4, and for purposes of complying with OMC Chapter 15.27, seismicity parameters and site coefficients shall be those corresponding to the default designation of Site Class D unless site-specific geotechnical data is shown to justify a different designation. For any site designated as Site Class E or F, the value of F_a shall be taken as 1.2. Site-specific procedures are not required for compliance with this chapter. Mitigation of existing geologic site hazards such as liquefiable soil, fault rupture, or landslide is not required for compliance with OMC Chapter 15.27.

Commentary: This modification is made for consistency with CEBC Chapter A4. For additional background, see the commentary on CEBC Section A403.3.2 in Part C of this Bulletin.

Consistent with current CBC Chapter 35 and CEBC Chapter 16, all references to “ASCE 7” mean ASCE/SEI 7-16 with Supplements 1, 2, and 3.

D.4.3 Benchmark Buildings (ASCE 41 Section 3.3). In ASCE 41 Table 3-2, the benchmark code of 1976 UBC for Building Types W1 and W2 does not apply.

Commentary: Per OMC Section 15.27.030, the chapter applies to buildings constructed before 1991 or designed with the 1985 or earlier edition of the Uniform Building Code. Most buildings subject to OMC Chapter 15.27 will be type W1a and will therefore not be eligible for benchmarking with ASCE 41 Table 3-2, but this restriction is made for buildings that might be classified as type W1 or W2.

D.4.4 Performance Level and Seismic Hazard Level (ASCE 41 Sections 4.1.1 and 4.1.2). These sections do not apply.

Commentary: These ASCE 41 sections are moot, since the performance objective is given in Bulletin Section D.4.1. Since the given objective is consistent with the ASCE 41 “BPOE” objective, the Tier 1 and Tier 2 procedures are appropriate for buildings evaluated or retrofitted for compliance with OMC Chapter 15.27.

D.4.5 Selection and use of checklists (ASCE 41 Section 4.3). For evaluation of Structural Life Safety, the Tier 1 screening checklists for Collapse Prevention shall be used, except that checklist statements using Quick Check procedures shall be based on values provided for Life Safety performance.

Commentary: In ASCE 41-17, checklists are provided for the Immediate Occupancy and Collapse Prevention structural performance levels, but not explicitly for Life Safety. This provision clarifies how to use the checklists for the OMC Chapter 15.27 objective. It is consistent with footnote d to ASCE 41 Table 2-2.

D.4.6 Structural compliance (ASCE 41 Section 4.3 and Table 17-2). Compliance with OMC Chapter 15.27 using ASCE 41 requires full compliance with all applicable ASCE 41 provisions, unless specifically noted in this Bulletin. A finding of “Compliant” for the Weak Story and/or Soft Story Tier 1



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checklist items shall not by itself indicate compliance with OMC Chapter 15.27.

D.4.7 Geologic site hazards (ASCE 41 Section 4.3 and Table 17-2). ASCE 41 Tier 1 checklist items for Liquefaction, Slope Failure, and Surface Fault Rupture do not apply.

Commentary: Compliance with OMC Chapter 15.27 does not require mitigation of existing geologic site hazards.

D.4.8 Modeling Primary and Secondary Components (ASCE 41 Section 7.2.3.3) Only primary components are to be modeled in linear analyses. In particular, for purposes of establishing the distribution of story forces, discontinuous upper story walls and partitions should not be modeled unless their stiffness is reduced to account for lack of overturning resistance or load path to elements below.

Commentary: This provision is consistent with CEBC Chapter A4 Section A403.3.1 (see Part C). See also the commentary to Bulletin Section D.3.2.

D.4.9 Modeling Overturning (ASCE 41 Section 7.2.8). Where dead loads alone are used to resist overturning, existing walls without hold-downs should be considered force-controlled for purposes of checking overturning. Existing walls without hold-downs may be considered deformation-controlled for purposes of checking shear strength, as long as the demands and capacities assigned to them account for the lack of hold-downs. Alternatively, where in accordance with ASCE 41 provisions for designating secondary elements, existing walls without hold-downs may be designated as secondary and removed from the linear model for purposes of distributing design forces to retrofit elements.